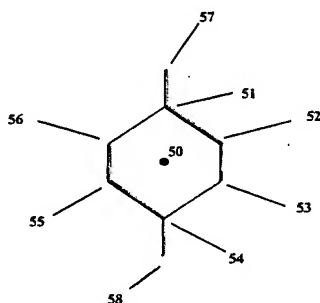


WHAT IS CLAIMED IS:

1. A nanoscale device comprising at least one diamond-based component selected from the group consisting of rods, brackets, screws, and gears.
2. A nanoscale device comprising at least one rod-shaped diamondoid for use as a structural member in nanoscale construction, the rod-shaped diamondoid having an even number of adamantane subunits, and displaying the following pattern when its constituent carbon atoms are projected onto the (110) crystallographic plane of the diamond lattice structure:

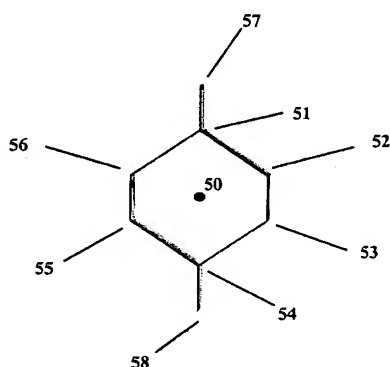


- wherein the atoms that project onto positions 57 and 58 are secondary carbons; the two atoms from the ends of a chain that project onto positions 51, 54 are tertiary carbons, and quaternary carbons if they are in the middle of the chain that projects onto the positions 51, 54;
- the two atoms from the ends of a chain that project onto positions 52, 56 are secondary and tertiary, respectively, and tertiary carbons if they are in the middle of the chain that projects onto the positions 52, 56; and
- the two atoms from the ends of a chain that project onto positions 53, 55 are secondary and tertiary, respectively, and tertiary carbons if they are in the middle of the chain that projects onto the positions 53, 55.
3. The nanoscale device of claim 2, wherein the carbon atoms comprising the rod-shaped diamondoid are substantially sp^3 -hybridized.

4. The nanoscale device of claim 2, wherein the length of the rod-shaped diamondoid has an approximate length with in range of about 0.907 to 1.376 nanometers.

5. The nanoscale device of claim 2, wherein the rod-shaped diamondoid is selected from the group consisting of [121] tetramantane, [12121] hexamantane, and [1212121] octamantane.

6. A nanoscale device comprising at least one rod-shaped diamondoid for use as a structural member in nanoscale construction, the rod-shaped diamondoid having an odd number of adamantane subunits, and displaying the following pattern when its constituent carbon atoms are projected onto the (110) crystallographic plane of the diamond lattice structure:



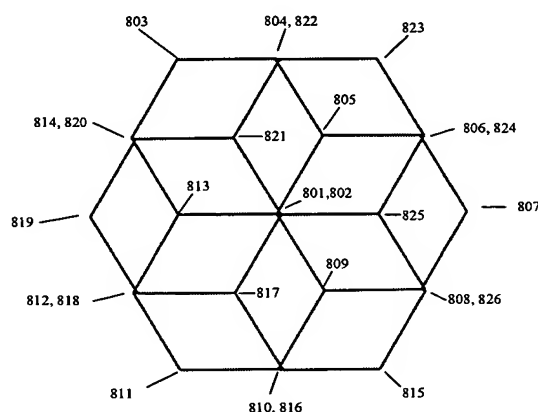
wherein the atoms that project onto positions 57 and 58 are secondary carbons; the two atoms from the ends of a chain that project onto positions 51, 54 are tertiary carbons, and quaternary carbons if they are in the middle of the chain that projects onto the positions 51, 54;

the two atoms from the ends of a chain that project onto positions 52, 56 are secondary carbons, and tertiary carbons if they are in the middle of the chain that projects onto the positions 52, 56; and

the two atoms from the ends of a chain that project onto positions 53, 55 are secondary carbons, and tertiary carbons if they are in the middle of the chain that projects onto the positions 53, 55.

7. The nanoscale device of claim 6, wherein the carbon atoms comprising the rod-shaped diamondoid are substantially sp^3 -hybridized.
8. The nanoscale device of claim 6, wherein the length of the rod-shaped
5 diamondoid has an approximate length with in range of about 0.940 to 1.218 nanometers.
9. The nanoscale device of claim 6, wherein the rod-shaped diamondoid is selected from the group consisting of [1212] pentamantane and, [121212] heptamantane.
- 10 10. A nanoscale device comprising at least one bracket-shaped diamondoid selected from the group consisting of an "L" shaped component, a "Y" shaped component, an "X" shaped component, a "+" shaped component, and a "Z" shaped component.
11. The nanoscale device of claim 10, wherein the carbon atoms comprising the
15 bracket-shaped diamondoid are substantially sp^3 -hybridized.
12. The nanoscale device of claim 10, wherein the bracket-shaped diamondoid comprises two enantiomeric forms which are nonsuperimposable mirror images of one
20 another.
13. The nanoscale device of claim 10, wherein the bracket-shaped diamondoid comprises attachment points that are selected from the group consisting of secondary, tertiary, and quaternary carbons.
- 25 14. The nanoscale device of claim 10, wherein the bracket-shaped diamondoid comprises a [1(2)3(1)2] hexamantane component.
15. A nanoscale device having at least one screw-shaped diamondoid.
- 30 16. The nanoscale device of claim 15, wherein the screw-shaped diamondoid is selected from the group consisting of a [12324] hexamantane, a [123] tetramantane, [123412] heptamantane, and [1234] pentamantane.

17. A nanoscale device having at least one disc-shaped diamondoid for use as a gear, rotor, or impeller, the disc-shaped diamondoid displaying the following pattern when its constituent carbon atoms are projected onto the (111) crystallographic plane of the diamond lattice structure:



wherein the atoms that project onto positions 801, 802 are quaternary carbons.

10

18. The nanoscale device of claim 17, wherein the the carbon atoms comprising the disc-shaped diamondoid that project onto positions 805, 809, 813 comprise an inner annulus with a top layer of carbon atoms, and wherein the the atoms that project onto positions 805, 809, 813 are tertiary carbons;

- 15 wherein the atoms that project onto positions 821, 825, 817 comprise an inner annulus with a bottom layer of carbon atoms, and wherein the the atoms that project onto positions 821, 825, 817 are tertiary carbons;

- 20 wherein the atoms that project onto positions 803, 804, 806, 807, 808, 810, 811, 812, 814 comprise an outer annulus with a top layer of carbon atoms, and wherein the the atoms that project onto positions 803, 807, 811 are secondary carbons, and wherein the atoms that project onto positions 804, 806, 808, 810, 812, 814 are tertiary carbons; and

wherein the atoms that project onto positions 815, 816, 818, 819, 820, 822, 823, 824, 826 comprise an outer annulus with a bottom layer of carbon atoms, and wherein the the atoms that project onto positions 815, 819, 823 are secondary carbons, and wherein the atoms that project onto positions 816, 818, 820, 822, 824, 826 are tertiary
5 carbons.

19. The nanoscale device of claim 17, wherein the the carbon atoms comprising the disc-shaped diamondoid are substantially sp^3 -hybridized.

10 20. The nanoscale device of claim 17, wherein the disc-shaped diamondoid comprises [12312] cyclohexamantane.